DEPARTMENT OF ENERGY	LESSON PLAN
	Course: Radiological Control Technician Unit: Site Academics Lesson: 2.10 Access Control and Work Area Setup

Learning Objectives:

☞ 2.10.01 State the purpose of and information found on a Radiological Work Permit (RWP) including the different classifications at your site.

☞ 2.10.02 State responsibilities in using or initiating a RWP.

☞ 2.10.03 State the document that governs the ALARA program at your site.

☞ 2.10.04 Describe how exposure/performance goals are established at your site.

☞ 2.10.05 State the conditions under which a pre-job ALARA review is required at your site.

☞ 2.10.06 State the conditions under which a post-job ALARA review is required at your site.

2.10.07 State purpose of radiological postings, signs, labels, and barricades; and the RCTs responsibilities for them.

☞ 2.10.08 Identify the following radiological postings at your site, requirements for posting/barriers, and requirements for entry:

a. Radiological Buffer Area
b. Radiation Area
c. High Radiation Area
d. Very High Radiation Area
e. Hot Spot
f. Surface Contamination Area
g. High Surface Contamination Area
h. Airborne Radioactivity Area
i. Fixed Surface Contamination
j. Soil Contamination
k. Radioactive Material Storage Area

(Continued on next page)

Learning Objectives (continued):

2.10.09 Describe good practices, support equipment to use, and common discrepancies in setting up radiological areas.

2.10.10 List discrepancies frequently observed in containment devices.

2.10.11 Describe good practices in setting up portable ventilation systems and count rate meters.

☞ 2.10.12 List the requirements individuals must follow while working in RBAs.

☞ 2.10.13 State the requirements for removing or releasing materials from any radiological area.

References:

1. Radiological Control Manual, DOE/EH-0256T

Instructional Aides:

Overheads, overhead projector/screen, chalkboard/whiteboard

LESSON PLAN | INSTRUCTOR'S NOTES

I. LESSON INTRODUCTION

A. Self Introduction

1. Name
2. Phone number
3. Background

B. Motivation

This lesson presents instruction in Radiological Work Permits, various types of postings used in radiological areas, setting up radiological areas, access controls, and releasing of material from radiological areas. All of these are fundamental duties of RCTs.

C. Lesson Overview

1. General Overview - Area setup and access control
2. Points of importance
   a. RWPs
   b. Radiological postings
   c. Setting up radiological areas
   d. Good practices and discrepancies commonly observed in setup of various portions of radiological areas.
   e. Access control
   f. Removing materials from radiological areas

D. Introduce Objectives — O.H.: Objectives

II. LESSON OUTLINE

A. RADIOLOGICAL WORK PERMITS (RWP)

See DOE RCM Art. 321-323

(Insert site specific information here)

Objective 2.10.01

1. Structure of an RWP
   a. Description of work
   b. Work area radiological controls
   c. Dosimetry requirements
   d. Pre-job briefing requirements, as applicable

e. Training requirements for entry

f. Protective clothing and respiratory protection requirements

g. Radiological control coverage requirements and stay time controls, as applicable

h. Limiting radiological conditions that may void the RWP

i. Special dose or contamination reduction considerations

j. Special personnel frisking considerations

k. Technical work document number, as applicable

l. Unique identifying number

m. Date of issue and expiration

n. Authorizing signature

2. RWPs shall be used to control the following activities:

a. Entry into High and Very High Radiation Areas

b. Entry into High Contamination Areas

c. Entry into Airborne Radioactivity Areas

3. RWPs should be used to control the following activities:

a. Entry into Radiation Areas

b. Entry into Contamination Areas

c. Handling of materials with removable contamination that exceeds the values in Table 2-2

4. Responsibilities when using an RWP

a. It is important for individuals to comply with the requirements of the RWP to prevent personnel contamination or unnecessary radiation exposure.

(Insert site specific information here) Objective 2.10.02

B. ALARA CONSIDERATIONS FOR ACCESS CONTROL AND WORK AREA SETUP

1. ALARA documentation

   (Insert site specific information here) — Objective 2.10.03

2. Exposure/performance goals — See DOE RCM Art. 131-133 (or appropriate site document)

   (Insert site specific information here) — Objective 2.10.04

3. Pre-job ALARA Reviews

   a. At a minimum, the pre-job briefing should include: — DOE RCM Art. 324.2

      1. Scope of work to be performed
      2. Radiological conditions of the workplace
      3. Procedural and RWP requirements
      4. Special radiological control requirements
      5. Radiologically limiting conditions, such as contamination or radiation levels that may void the RWP
      6. Radiological Control Hold Points
      7. Communications and coordination with other groups
      8. Provisions for housekeeping and final cleanup
      9. Emergency response provisions

   b. Pre-job ALARA review requirements — Objective 2.10.05

      (Insert site specific information here)

4. Post-job ALARA Reviews

   a. Post-job meetings allow the opportunity to critique the work performance. Although, they will not affect the dose already received for a particular job, they can be effective in reducing the doses received the next time that job is performed.

b. Information discussed at post-job meetings includes discussions of what went wrong and what could have been done differently to reduce the exposures received.

c. Post-job meetings rely heavily on the input of each radiation worker for information on how best to reduce exposure the next time that job is performed.

d. Typical questions asked could include:

1) Were there any problems performing the job in accordance with the procedure?

2) Did you have the tools and equipment needed to perform the work? Could special tools ease the job?

3) Were there any unexpected conditions noted during the work? Could these conditions have been anticipated?

4) Were there any unexpected delays in the performance of the job? What was the cause of the delay?

5) Was temporary shielding used? Could the use of temporary shielding reduce exposures received for this job?

e. Post-job ALARA Review Requirements Objective 2.10.06

(Insert site specific information here)

C. RADIOLOGICAL POSTINGS Objective 2.10.07

1. Purpose of radiological postings, signs and labels is to:

a. Identify items or areas that have the potential for, or actually contain, radiological hazards.

b. Identify the radiological hazard(s) present in an area (e.g. Radiation Area, Airborne Radioactivity area, Radiography Area).

c. And to prevent:

1) Workers from inadvertently entering radiologically controlled area(s), and/or

2) Mishandling radioactive materials.

2. Each individual is responsible to read and comply with all the information identified on radiological postings, signs and labels.

3. Since there may be more than one radiological hazard identified on a posting, sign or label, it is important to read all of the information and not just the first line.

4. All access points into an area must be posted to ensure workers are adequately warned of the hazards in the area.

5. Postings and status boards (if applicable) should be promptly updated after completion of a survey to reflect the corrected conditions in the area.

6. If necessary the RWP should be amended to reflect any changes in the area.

7. The information on status boards, RWPs, posting and survey maps should be consistent. If there is a discrepancy it should be immediately corrected. Workers could review erroneous data that has not been updated and subsequently become contaminated or receive some unnecessary radiation exposure.

   a. Radiological Control Technicians should immediately update postings after performing a survey. The RWP and any status boards must also be updated.

   b. If the posting was updated and the RWP was not, a worker may consider the RWP correct and the posting wrong.

   c. If a worker entered the area based on the incorrect RWP information he could become contaminated or receive some unnecessary radiation exposure.

8. Areas should be posted if there is a strong potential for the situation to exist, even if it is not now present.

a. Areas can be posted as Airborne Radioactivity Areas or Surface Contamination Areas, if equipment in the area has been known to leak and create airborne or contamination hazards. Posting areas in such a situation will ensure that the proper protective equipment is used and could prevent a personnel contamination incident or a case of internal exposure.

b. If areas are posted only when the appropriate limits have been reached, personnel can be subjected to hazards when the hazard could have otherwise been minimized.

9. Disregarding any radiological posting, sign or label can lead to unnecessary or excessive radiation exposure and/or personnel contamination.

State the radiological consequences of disregarding radiological postings, signs and labels.

10. Unauthorized removal or relocation of radiological postings, signs and labels may lead to disciplinary actions up to and including job termination.

State the disciplinary consequences of unauthorized removal or relocation of radiological postings, signs and labels.

11. If any type of material used to identify radiological hazards is found outside an RBA, it should be reported to radiological control personnel immediately. RCT shall perform a survey of the sign, posting or label and conduct a survey of the area in which it was found.

a. Any contamination or higher than expected radiation levels must be promptly reported to the RCT supervisor.

D. TYPE OF RADIOLOGICAL POSTINGS, SIGNS AND LABELS

Objective 2.10.08

1. Area designations

(Insert site specific information here)

See DOE RCM Art. 231-237 (or appropriate site document)

2. Requirements for posting/barriers

(Insert site specific information here)

3. Requirements for entry

See DOE RCM Art. 331-336 and Appendix 3B (or appropriate site document)

(Insert site specific information here)

E. SETTING UP RADIOLOGICAL AREAS

Objective 2.10.09

1. Good practices to be considered whenever possible in setting up Radiological Areas.

   a. Establish walkways in low dose areas.

   b. Do not store radioactive materials near walkways or where personnel frequently work.

   c. Place rope boundaries as close to the source of contamination as possible to minimize the size of the contaminated area. Care must be taken to ensure the area is not so limited that contamination is easily spread across the boundaries.

   d. Use appropriate containment devices to prevent the spread of contamination.

   e. Establish laydown areas for equipment to limit personnel safety hazards and/or radiation exposure.

   f. Set up SOPs upwind of contamination hazards.

   g. Post all accessible sides and entrance(s) to areas containing radiological hazards.

   h. Use Personnel Contamination monitors along with portable contamination survey instrumentation whenever possible.

   i. PCMs are more likely to detect contamination on individuals because personnel tend to survey too quickly.

If this happened with an actual contamination incident the employee surveying quickly could subsequently pass over the contamination areas with the portable contamination survey instrumentation.

2. The following are commonly observed discrepancies that should be avoided in the setup of Radiological Areas.

   a. Posting information not updated or information otherwise incorrect.

   b. Boundaries not verified for contamination, radiation, and airborne radioactivity hazards.

   c. Survey instruments out of calibration or defective.

   d. Step-off-pads not set up for efficient removal of protective clothing. (Not enough room to prevent contaminating the SOPs.)

   e. Laundry and waste receptacles not placed for efficient use or not placed at all. Receptacles not properly labeled as to their contents.

   f. Boundaries of areas setup too far from the hazards interfering with access to areas otherwise unaffected.

   g. Portable contamination survey instruments not located close to the step-off-pads.

   h. Status boards do not reflect where SOPs and boundaries lie.

   i. Status board not kept up-to-date. The information on status boards, postings and RWPs should agree.

   j. Tripping hazards exist from wires, hoses, or cables.

   k. Background radiation in monitoring area too high for efficient detection of low level contamination.

   l. Instrumentation not set up for proper operation.

   m. Protective clothing (gloves and booties) not readily available in a personnel contamination event.

   n. Phone or other communication devices not available near the SOP or portable contamination survey instruments.

o. Not posting all accesses to the area.

3. Since contamination or airborne radioactivity and radiation levels are subject to change, it is essential to be able to quickly establish a Radiological Area. To properly set up a Radiological Area, the following support equipment should be readily available.

   a. Step-off-pads.

   b. Portable contamination survey instrumentation/personnel contamination monitors to establish at exits to Contamination Areas, Airborne Radioactivity Areas, and RBAs.

   c. Yellow and magenta rope, ribbon or tape.

   d. Laundry receptacles.

   e. Waste receptacles (clean and radioactive waste receptacles).

   f. Receptacles for defective protection clothing (optional).

   g. Receptacles for non-compactable waste (optional).

   h. Receptacles for mixed waste (optional).

   i. Electrical power supply and extension cords (optional).

   j. Postings, signs, labels, and posting inserts.

   k. Communication equipment readily available.

   l. Additional protective clothing.

   m. Dose rate meters and smears.

   n. Survey maps.

4. Containment devices include glove boxes, glove ports, hot cells, huts, and windbreaks. Common discrepancies observed in containment devices include. Objective 2.10.10

   a. Holes/leaks in the containments, facilitating the spread of contamination.

b. Liquids accumulating in hoses or main portions of the containment.

c. Airlocks too small to remove protective clothing without spreading contamination.

d. Ventilation exhaust not directed to the plant ventilation system.

e. Material allowed to accumulate inside containments, limiting safe and/or efficient use.

f. Sharp objects used inside containments (not covered or taped).

g. Devices not tethered to prevent introduction into systems.

h. Transfer sleeves/ports are not used or are unavailable.

i. Containment not provided with a HEPA filter or ventilation exhaust.

j. Containments not periodically surveyed inside and out.

k. No means of quickly verifying loss of ventilation.

l. Containment not decontaminated prior to dismantling.

m. Adequate access not provided for lines or hoses.

n. Containment not maintained at a negative pressure.

o. Containment not supported properly to minimize stress from minor ventilation changes or not structurally supported to maintain its configuration during use.

p. Containments not inspected prior to use and periodically during use.

q. Not using appropriate containment devices for leaks.

r. Not using a funnel to collect leakage, if appropriate.

s. Plastic components showing fatigue or wear.

t. Funnel not positioned to collect all leaking fluid, if appropriate.

u. Drain lines kinked allowing the buildup of liquids.

v. Drain lines not secured properly to the collection device.

w. Containment device not labeled to indicate hazards that are present.

5. Portable ventilation systems are frequently used to remove contaminated air or filter contamination in the air. Radiological control personnel should adhere to the following good practices in setting up portable ventilation systems. Objective 2.10.11

a. Use only HEPA (High Efficiency Particulate Air) filters with pre-filters (roughing filters).

b. Perform radiation survey on filters periodically while in use.

c. Have radiological limits established for filter replacement.

d. Exhaust filter discharge to the plant ventilation system whenever possible.

e. Ensure that there are no openings in the trunk or between the blower and the filter.

f. Monitor the filter differential pressure (d/p) periodically.

g. Establish filter D/P at which the filter must be replaced.

h. Remove filters into plastic bags to prevent the release of activity.

i. Position streamers to signify the flow of ventilation through doorways or through containment devices.

6. The proper setup and use of portable contamination survey instruments and Personnel Contamination Monitors (PCMs) can ensure that contamination is more likely to be detected on workers. The following is a list of good practices for setting up portable contamination survey instrumentation and PCMs.

   a. They must be placed in low background area.

   b. They need reliable power supply.

   c. They should be positioned to facilitate easy access by workers.

   d. Alarms should be set according to site administrative control levels or DOE limits.

   e. Must ensure instrument is source checked and calibrated.

   f. Extension cords must be checked for electrical safety.

   g. Portable contamination survey instruments and PCMs should be placed upwind of contaminated areas.

   h. They should not be placed near radioactive material storage areas or other areas where the background radiation can change.

   i. Portable contamination survey instruments should have sources provided to source check the instrument.

F. ACCESS CONTROL Objective 2.10.12

1. To maintain personnel internal and external exposure ALARA, access to the RBA and Radiological Areas must be controlled. The following is a list of access control requirements for entries into Radiological Areas and RBAs that are enforced to maintain workers' exposure ALARA. These requirements are in addition to other requirements previously mentioned.

   a. Entry and Exit requirements for Radiological Buffer Areas.

(Insert site specific information here)

2. Besides meeting the requirements for entry into Radiological Areas and RBAs, personnel must also ensure that they take appropriate measures to maintain their exposures ALARA.

   a. Workers who receive radiation exposures from other nuclear facilities must report the exposure to radiological control and their supervisor upon returning to the site.

   b. Avoid contact with potentially contaminated surfaces.

   c. Any management/supervision or RCT personnel should give stop work or evacuation orders if unanticipated radiation or contamination is encountered or if the appropriate RWP is not being followed.

   d. Handle all tools and equipment properly inside RBAs.

   e. Wear dosimetry when required and in the prescribed locations.

   f. Maintain exposure ALARA.

   g. Report all injuries.

   h. Monitor clothing and exposed skin as required and report the presence of radioactive contamination.

   See DOE RCM Art. 338 and Appendix 3D (or appropriate site document)

   i. Place contaminated items and waste in the proper receptacles.

   j. Personnel should wash their hands when leaving the RBA and prior to eating or using tobacco products.

   k. Personnel who are not respirator qualified shall not enter areas posted as "Respiratory Protection Required".

| l. Personnel entering Hot Particle Areas.

| *(Insert site specific information here)*

G. REMOVING MATERIALS FROM RADIOLOGICAL AREAS

Objective 2.10.13

Facility operations require that radioactive material and non-radioactive material be removed from Radiological Areas, RBAs, and from the site. Prior to allowing this material to leave, important steps outlined in the procedures must be followed. The following guidance is taken from the procedures to protect the health and safety of individuals who may come in contact with or within close proximity to the materials.

1. Release to Radiological Buffer Areas

(Insert site specific information here)

2. Release to Uncontrolled Areas

(Insert site specific information here)

III. SUMMARY

A. Review major topics

1. RWPs
2. Radiological postings
3. Setting up radiological areas
4. Good practices and discrepancies commonly observed in setup of various portions of radiological areas.
5. Access control
6. Removing materials from radiological areas

B. Review learning objectives

IV. EVALUATION

Evaluation shall consist of a written examination comprised of multiple choice, fill-in the blank, matching and/or short answer questions. 80% shall be the minimum passing criteria for examinations.